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ARMORED
MEDICAL RESEARCH LABORATORY

FORT KNOX, KENTUCKY

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PROJECT NO. 6 - VISION IN TANKS

Report On

Target Designating Device for Transmission of Intelligence Between Tank Commander and Tank Gunner

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Project No. 6

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11 October 1945

ARMORED MEDICAL RESEARCH LABORATORY
Fort Knox, Kentucky

Project No. 6
SPMEA 741

11 October 1945

1. PROJECT NO. 6 - Vision in Tanks

a. Authority: Letter Commanding General, Headquarters Armored Force, Fort Knox, Kentucky, File 400.112/6 GNOHD, dated September 24, 1942.

b. Purpose: To discuss a target designating device for transmission of intelligence between tank commander and tank gunner.

2. DISCUSSION:

One of the tank commander's duties of first importance is to detect and indicate targets to the gunner. Conventionally the commander selects a target and (1) directs the gunner on the target by verbal instruction over the intercom or (2) traverses the turret using commander traverse control if available. In the latter case alignment in azimuth only is possible. The gunner must find approximate elevation by range information furnished by commander or by up and down search after azimuth alignment. In any case the present methods are time-consuming and of poor dependability especially in the noise and confusion of battle. The device described below is intended to indicate a means of overcoming the difficulties above enumerated and allow the commander to indicate the target to the gunner without verbal description and without the necessity of losing the target from view during the time the gunner is adjusting on target. It is intended only to indicate the target and is not intended as a fire control adjustment although the latter would be possible by refinement.

The device consists of two pairs of remote control position indicators and transmitters--one for azimuth and one for elevation. The transmitters are connected to the commander's periscope and the indicators are located in a position easily seen by the gunner. The indicators are of the zero setting type and are bore sighted to the gun at zero setting. Movement of the commander's periscope relative to the gun in azimuth or elevation, is indicated at the gunner's position.

In use the commander selects a target, gives the "on target" signal to the gunner who traverses as indicated by the indicator. During the time the gunner is traversing the commander holds his periscope on the target. The gunner traverses and elevates the gun until the indicators are both zeroed. The target then will be in the field of his sight close to the cross hairs.

A few minutes of training together is required for commander and gunner to operate smoothly. A laboratory installation of the device has been made on an M24 tank at the Armored Medical Research Laboratory.

The indicator for azimuth is of the Selsyn type (standard aviation instruments), the indicator for elevation, the balanced resistance type. Power requirement of both are negligible. Some difficulty is experienced by commander in holding periscope on target during gunner's traverse. This is caused by excessive sticking of the cupola rotor which can, of course, be corrected.

It is understood that a cupola is being developed by Ordnance to mount machine guns with power traverse. Such a gear driven cupola would be desirable for this device whether or not the machine guns are used. If power traverse is made available it can be connected to the device in such a manner that the commander would not have to hold on target during the time the gunner is laying on target. This may be too elaborate for consideration at present but can be borne in mind as a possibility.

Photographs and wiring diagrams are inclosed.

Appendix covers certain points not considered above.

3. RECOMMENDATIONS:

a. That the Army Ground Forces Board No. 2 and Ordnance inspect the installation and run such tests as seem desirable to determine if there is a military requirement for such a device.

b. That, providing a military requirement is established, that Ordnance develop and install the equipment in vehicles as established by military requirement for such a device.

NOTE: 1. The recommendations as set forth in this project have been concurred in by Colonel Louis V. Hightower, President, Army Ground Forces Board No. 2.

2. Informal testing will be conducted by Army Ground Forces Board No. 2 to compare the Target Designating Device with a Polaroid Glass Vane Sight, which is mounted on a bracket at the front vision block of the vision cupola and is linked to the gunner's periscope holder. The decision as to the military requirement for the Target Designating Device or for the development of some other means of transmitting intelligence from the tank commander to the gunner will be withheld pending outcome of these tests.

Submitted by:
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Henry A. Coopmans, SP-8

APPROVED BY William B. Bean
WILLIAM B. BEAN
Major, Medical Corps
Commanding

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#1 - Appendix
#2 - Wiring Diagram
#3 - Photographs 1 thru 5

APPENDIX

DISCUSSION:

It is emphasized that the installation made on the M24 at this laboratory should not be considered as a finished combat installation but rather an expression of an idea for overcoming certain objections to present means of target designation and to provide better means for designation between commander and gunner.

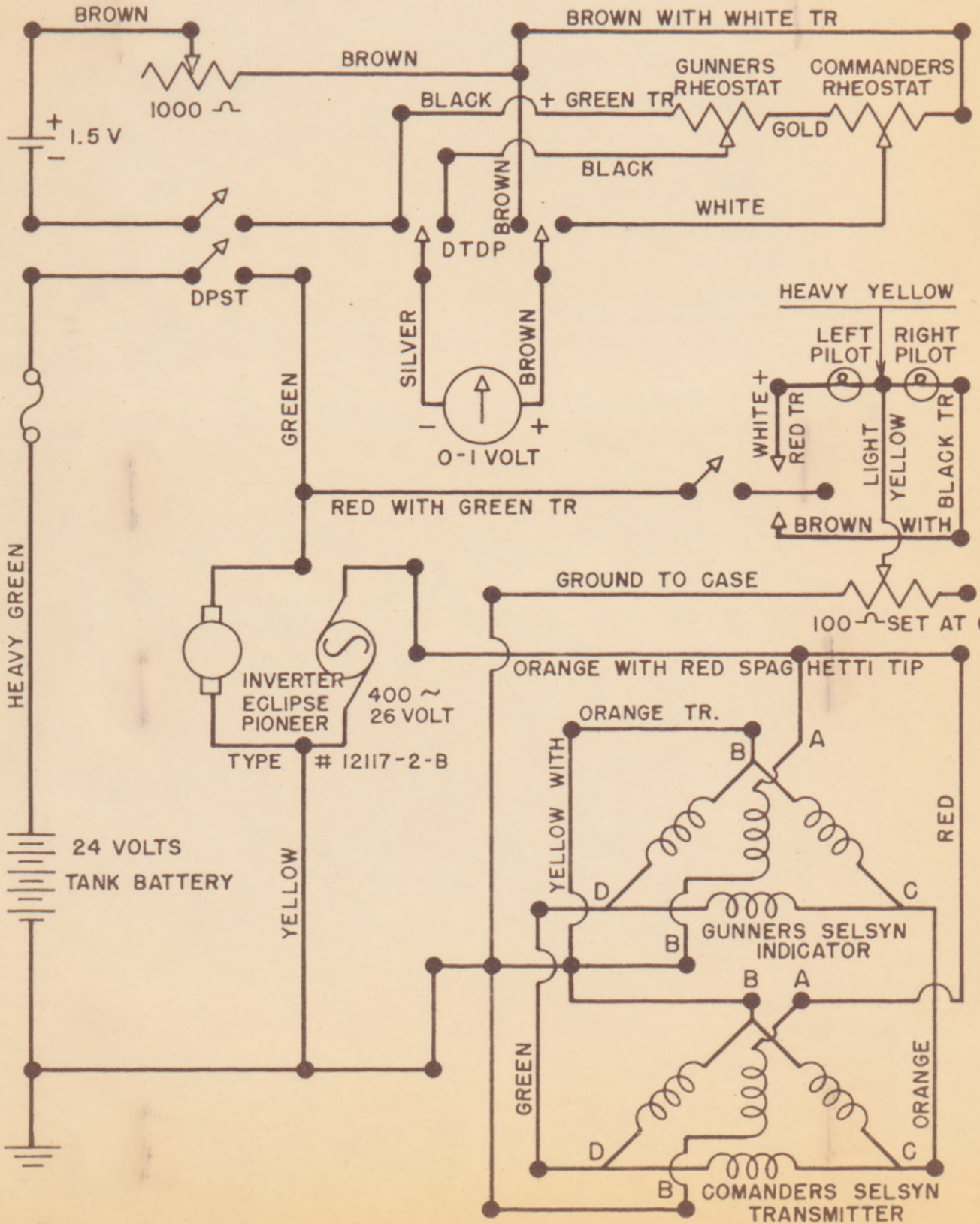
The usefulness of such a device is enhanced by the use of the M10 periscopic binocular which will be standard equipment for Tank Commander.

There is an understandable natural reluctance on the part of many to "shy" away from "gadgets" to accomplish certain ends. The present installation certainly comes under the gadget category, and it is expected that objections will justifiably be made to it on this basis. The question then is: Can the job done by the gadget be done by some other means and, if not, does the usefulness of the gadget outweigh its complexity, cost, maintenance, space requirements or whatever else puts it into the gadget class? In other words, is it worth what it costs?

Reports from Commander and Gunner from all theatres indicate that some means for target designation is desirable and a definite requirement. In the Pacific theatre it has been necessary in some cases for the Gunner to get out of the tank and study the target through a separate sight previously trained on it. This is an unusually severe example but many of less difficulty are quite common.

It is hoped that the idea expressed will be developed to make target designation easier and quicker.

WIRING DIAGRAM FOR TANK COMMANDER TO GUNNER TARGET INDICATING DEVICE



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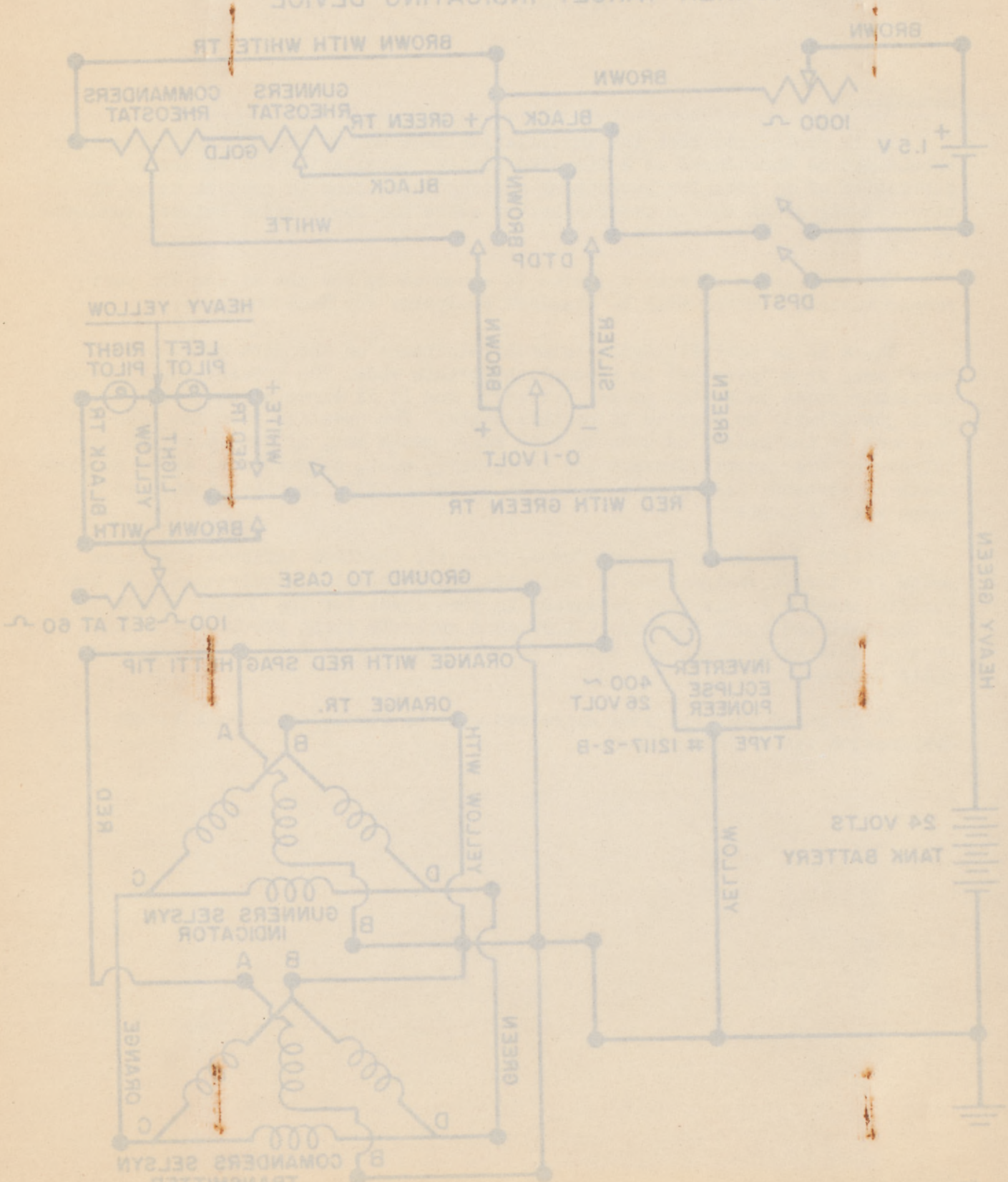
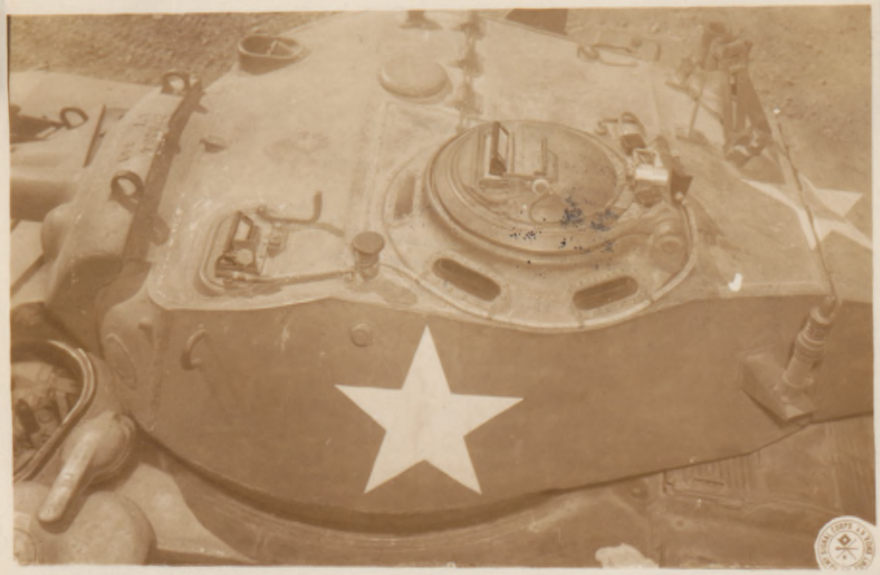
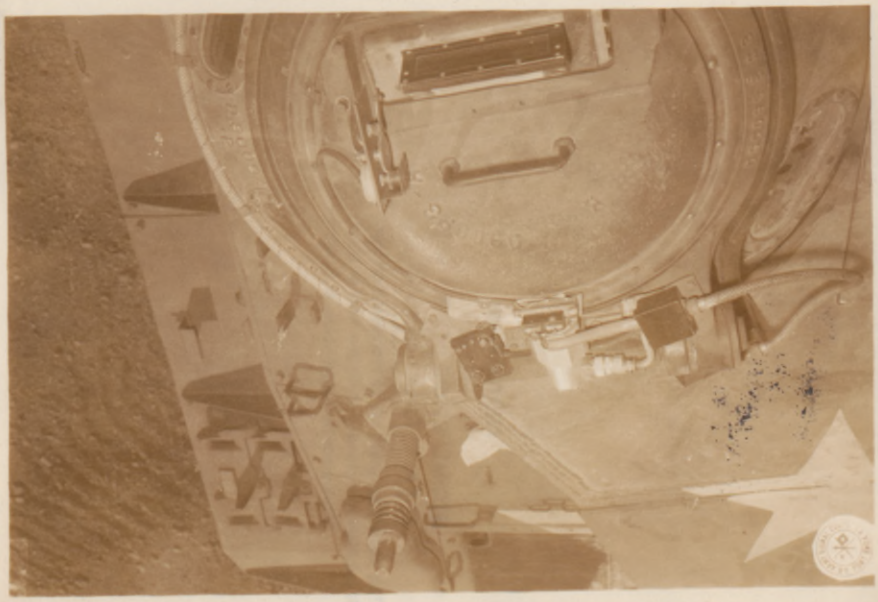
WIRING DIAGRAM FOR TANK COMMANDER TO GUNNER TARGET INDICATING DEVICE





General Outside View of Laboratory Installation
ARMORED MEDICAL RESEARCH LABORATORY
FORT KNOX, KY.

Photograph #1



Top View of Commander's Cupola Showing General Layout
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Photograph #2

Incl. #3

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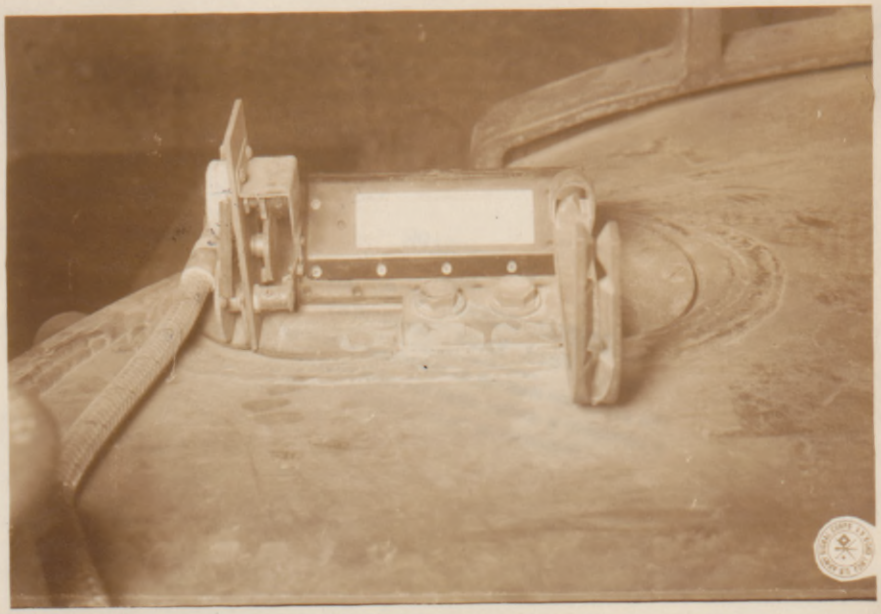

Gunner's Periscope Showing Elevation Transmitting Mechanism
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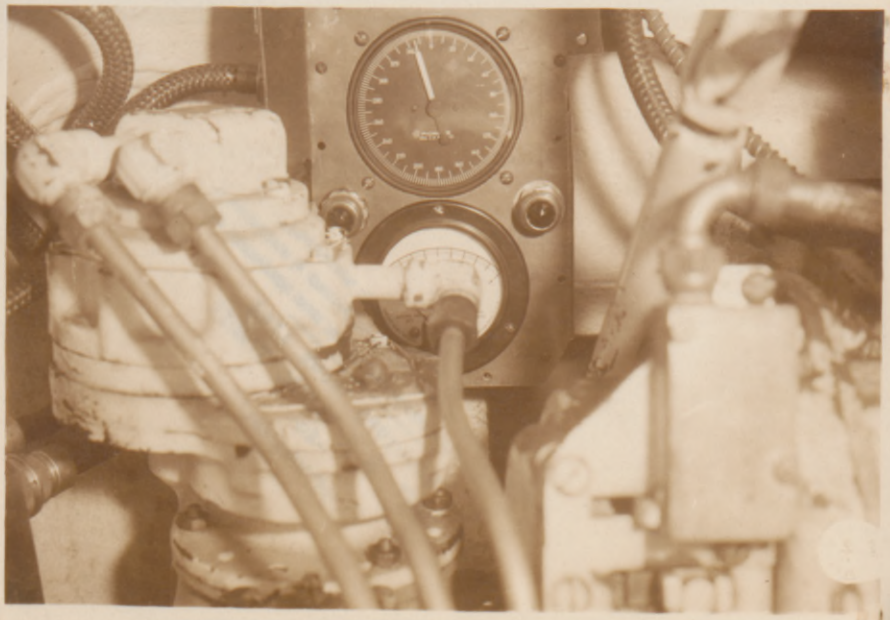
Photograph #3



Gunner's Station Showing Azimuth Indicator, Elevation
Indicator (Partially Covered) and Direction Indicating Lights
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Photograph #4

Incl. #3

Rack, commutator and Switch Control on Cupola

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Photograph #5

Incl. #3